URS

EPA Region 5 Records Ctr.
325302

October 21, 2005

Submitted Via Federal Express

Ms. Terese VanDonsel
United States Environmental Protection Agency
Office of Superfund, Region 5
SR-6J
77 West Jackson
Chicago, IL 60604-3590

Subject: Remedial Design / Remedial Action Work Plan for
Resolution of DNAPL Releases
Detrex Source Control Area – Fields Brook Superfund Site
Detrex Corporation, Ashtabula, Ohio
Docket No. V-W-98-C-450

Dear Ms. VanDonsel:

On behalf of Detrex Corporation, URS Corporation (URS) has prepared two (2) copies of the enclosed *Remedial Design/ Remedial Action Work Plan for Resolution of DNAPL Releases for the Detrex Corporation Source Control Area* for submittal. This Work Plan has been prepared in accordance with your request dated September 19, 2005 that was received by Detrex on September 22, 2005.

Detrex Corporation would like to schedule a meeting in the near future with USEPA to discuss this plan. If possible, please check your schedule so that a convenient time to meet on-site can be arranged. If you have any questions, please do not hesitate to contact me at 216.622.2432 or Detrex personnel.

Sincerely,

URS Corporation

Martin L. Schmidt, Ph.D.
Vice President

Enclosure

cc: R. Currie – Detrex Corporation
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WORK PLAN

REMEDIAL DESIGN / REMEDIAL ACTION (RDRA) WORK PLAN FOR RESOLUTION OF DNAPL RELEASES

DETREX FACILITY
ASHTABULA, OH
DOCKET NO. V-W-98-C-450

Prepared for
Detrex Corporation
Ashtabula, OH

October 2005

URS

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DNAPL	Dense Non-Aqueous Phase Liquid
DPT	Direct-Push Technology
DS	As in DS Tributary (not defined-Page 1-1)
FBAG	Fields Brook Action Group
PID	Photo Ionization Detector
QAPP	Quality Assurance Project Plan
RD/RA	Remedial Design / Remedial Action
ROD	Record of Decision
SVOC	Semi-Volatile Organic Compound
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

During routine maintenance conducted by the Fields Brook Action Group (FBAG) in May 2005, a pooled dark liquid was encountered in locations at Fields Brook that were remediated during 2000/2001 in EU-8. The dark liquid was sampled and determined via laboratory analyses to have similar elemental characteristics as DNAPL. This was in soil in the floodplain that was supposedly remediated during 2000/2001.

As a result, FBAG implemented an investigation of geoprobes and test trenches to identify the source of DNAPL. Even though no free DNAPL was observed in any of the test trenches, FBAG has identified potential pathways of DNAPL migration from the Detrex source area. These are described in a report submitted by FBAG to the United States Environmental Protection Agency (USEPA) on September 30, 2005. The FBAG report describes:

- DNAPL migration along the top of the lacustrine clay;
- DNAPL migration through the clay along bedding planes and sand seams;
- DNAPL migration along the top of the till layer; and
- DNAPL migration through old channel and infiltration into lacustrine / till layers.

Upon review of FBAG's preliminary data in early September 2005, Detrex undertook an investigation of their own that was supervised by URS that included fifteen (15) test pits and twenty-one (21) geoprobes in an attempt to locate DNAPL movement. The results from this investigation did not identify any DNAPL in the lacustrine clay formation.

On September 19, 2005, USEPA issued Detrex a Request for Work Plan for Resolution of DNAPL Release to Fields Brook. Detrex received this letter on September 22, 2005. The requested Remedial Design / Remedial Action (RD/RA) Work Plan needs to verify the potential mechanism of transport and stop any identified movement of contamination in the future. In addition, the Work Plan needs to identify short-term measures that would be put in place to stop a release as soon as possible and provide a schedule for long-term actions that would provide greater protection to Fields Brook. All actions are required to have a monitoring plan to assess the performance of the actions. Detrex has prepared this Remedial Design / Remedial Action RD/RA Work Plan in response to USEPA's request dated September 19, 2005.

1.1 REMEDIAL ACTIONS IN PLACE

The 1997 Record of Decision for Detrex Source Area included the following components to address DNAPL. The construction of a slurry wall to contain DNAPL, installation of a groundwater-collection trench to collect contaminated groundwater and installation of vacuum enhanced wells to collect pooled DNAPL. The slurry wall was to be installed downgradient of DNAPL source areas and the extraction wells were to be installed near the leading edge of DNAPL source areas.

The remedial components were installed during 2000 and 2002, which included the following: slurry wall, groundwater collection trench on-site and in DS Tributary and 12 extraction wells.

Construction of the slurry wall and groundwater trench was completed in 2001. Operation of extraction wells began in 2002. Several wells have been exhibiting operational difficulties, and in 2005 a plan for modifying well construction was presented to USEPA. At this time USEPA has not provided comments to proposed recovery well modifications.

1.2 OVERVIEW OF REMEDIAL DESIGN / REMEDIAL ACTION WORK PLAN FOR POTENTIAL DNAPL RELEASE

In consideration of the potential DNAPL migration pathways identified by FBAG and existing site information, Detrex is proposing to evaluate the site for DNAPL flow and to determine an appropriate remedy, if needed, from the site evaluation. This remedy may include an interceptor trench. This Work Plan will discuss the two (2) areas of the site where additional data is needed in order to either verify or dispel the model proposed by FBAG and to assess the historical and ongoing monitoring that has been collected by Detrex. This Work Plan will discuss the RD/RA Plan for the Southern Area and the DS Tributary Area. In addition, the Work Plan will provide RD/RA Field Sampling and Quality Assurance Project Plan (QAPP) procedures to describe data collection. Proposed schedules are provided for Work Plan Resolution tasks for the Southern Area and the DS Tributary Area.

2.1 DESCRIPTION OF AREA

This section of the Site RD/RA Work Plan presents a discussion and description of short-term measures proposed to investigate and evaluate the potential for DNAPL to migrate to Fields Brook in the Southern Area of the facility.

The Southern Area component of this RD/RA Work Plan includes the entire southern half of the Detrex facility that lies between the operating portion of the facility and Fields Brook to the South. This area is shown on **Figure 2-1**. According to the FBAG report, the pathways of DNAPL movement include the following: on top of and within the lacustrine clay, on top of the till and beneath the former outfall channel.

2.2 SUMMARY OF EXISTING DATA

There are three (3) groundwater monitoring locations in this area that have been monitored during remediation. Locations are shown on Figure 2-3. Three (3) shallow monitoring wells have been sampled and include DETMW-11S, DETMW-18S, and DETMW-17S. Based on recent sampling from September 2005, wells MW-17S and MW-18S did not exhibit VOCs above detection limit and well MW-11S did not contain water and could not be sampled. These results are similar to the original sampling initiated by Detrex in March 2005. In addition, a review of RI data indicates that in 1994, both the shallow and deep wells did not report VOCs or SVOCs above detection limits. These wells are screened at the interface between the lacustrine clay and till.

In September 2005, Detrex, with URS oversight, initiated sampling using both test pits and geoprobes to collect soil and groundwater samples in portions of the Southern Area. This work was performed in response to preliminary data reported by FBAG in a technical meeting, which suggested DNAPL was migrating through the clay into Fields Brook. The digging of trenches, sampling of soil and water, analyses of soil and water, and interpretation of data was all overseen by URS. Detrex submitted this data to USEPA on September 15, 2005. Results from the investigation indicated that DNAPL was not observed in the lacustrine clay soil, in any test pit, or geoprobe location. These results remain the same, as of October 18, 2005. Groundwater and soil samples collected from the upper clay in the Southern Area did not detect any VOCs or SVOCs. Elevated concentrations of VOCs and SVOCs were identified in subsurface soils at two locations along the current surface water collection ditch that passes through this area. This surface water flows into Detrex's retention pond where it is then treated in their storm water treatment system prior to discharge to Fields Brook. No free DNAPL was observed in any test trench. Sampling locations are shown on **Figure 2-2**.

According to information provided by FBAG and as shown in **Figure 8** of the FBAG Report, thirty-six (36) Geoprobe locations were drilled on the western portion of the Southern Area. Based on the PID readings shown in **Figure 11** of the FBAG Report, it appears that no elevated PID readings were reported on the Detrex property. The map shows that all elevated PID readings were in the floodplain area. In addition, **Figure 13** of the FBAG Report depicts

potential erosional channels in the lacustrine clay. If these erosional channels were actual pathways for DNAPL movement, then it would be expected that elevated PID readings indicative of potential DNAPL or residual DNAPL would have been detected in this area. No soil samples were collected for analytical testing as a part of the FBAG investigation.

As a result of reviewing data collected by FBAG in the Southern Area and the associated lack of elevated PID readings on the facility, we are convinced that there are no complete pathways for DNAPL to migrate from the source area located 1,500 feet north to Fields Brook and reach the locations where DNAPL and PCBs have been identified in Fields Brook. However, in order to either verify or rule out potential DNAPL movement to Fields Brook, Detrex will initiate a delineation program to evaluate these areas.

2.3 PHASE I: ADDITIONAL DNAPL DELINEATION DATA / PRELIMINARY INTERIM MEASURES

Recent work performed by FBAG indicates the presence of potential pathways of DNAPL migration to Fields Brook within the Southern Area of the facility. Soil data collected from fifteen (15) test pits and twenty-one (21) Geoprobes by Detrex, overseen by URS, indicate the lacustrine clay does not contain VOCs, SVOCs or any indication of DNAPL. Since the actual occurrence of DNAPL or DNAPL impacted soil/groundwater has not been identified, Detrex is proposing to collect additional DNAPL delineation data in the Southern Area to verify potential transport mechanisms and update the Site Conceptual Model. All sample collection and analyses will be overseen by URS. The purpose of collecting this data will be to determine the need for and appropriate location and orientation of an interceptor trench that will be designed to cut off identified complete flow paths toward Fields Brook. At a minimum the following sampling program is planned:

- Approximately advance thirty-two (32) Direct-Push Technology (DPT) borings in Southern Area;
- Advance borings 5-10 feet into underlying till;
- Collect continuous samples and conduct PID headspace;
- Collect soil samples from highest PID or at top of FBAG identified the erosional lacustrine clay channels and underlying till;
- Install approximately nineteen (19)temporary piezometers utilizing DPT and collect groundwater samples; and
- Install approximately three (3) staff gauges within Fields Brook between State Road and the Detrex Retention Pond.

Proposed DPT borings and temporary monitoring well locations are shown on **Figure 2-3.** The final locations for these respective monitoring points will ultimately be based on field observations; therefore, the locations depicted on figure 2-3 are approximate.

In addition to collecting new data, all existing piezometers and monitoring wells in the Southern Area will be measured for water levels and sampled for VOCs and SVOCs. Specific procedures for sampling are described in Section 4.0.

2.4 PHASE II: PRELIMINARY DESIGN OF REMEDIAL ACTION INTERCEPTOR TRENCH

If the analytical results prove the DNAPL is moving to the south to potentially re-contaminate Fields Brook, Detrex is proposing to install a downgradient groundwater/DNAPL interceptor / interceptor trench. The actual location of the trench will be based on soil and groundwater analytical data collected during Phase I. If a trench is needed, it will be located in a clean area that is close to the identified DNAPL source, in order to minimize potential future impacts to down gradient to other clean areas of the Site and collect DNAPL close to the source. This down gradient interceptor trench, if installed, will be included as part of the long-term remedial measures for the Detrex Source Area remediation.

Considering existing monitoring data points, Detrex is proposing the following interim measure conceptual design for the proposed interceptor / interceptor trench, if needed.

- Segment 1: Between the DNAPL plume, as approximated by URS and DETMW17S, DETMW18S, depth 25 feet, extend into till, east-west orientation, length, approximately, 500 feet;
- Segment 2: Approximately 50 feet east of force main, depth 25 feet, extend to facility fence line, northwest-southeast orientation, length 500 feet; and
- Segment 3: Inside storm water collection basin, depth 15 feet, length 100 feet.

As described earlier, the position of the interceptor trench will be based on the confirmed presence of DNAPL impacted soil and groundwater. If needed, it will be Detrex's intent to provide a subsurface cut off mechanism as close to the DNAPL source area as possible, so as not to extend the size of the potentially impacted area. Additional details of the conceptual design include:

- Depth of trench will vary, but will extend into till layer;
- Trench will be sloped to facilitate water flow to central sumps;
- Recovered fluids will be pumped and treated on site;
- Trench will have an impermeable polyethylene DNAPL compatible liner placed on the downgradient side; and
- Total length of interceptor trench components will be approximately 1,000 feet.

A preliminary alignment of the interceptor trench and preliminary details showing construction of the trench are provided on **Figures 2-3** and **2-4**.

2.5 PROPOSED INTERCEPTOR TRENCH MONITORING PLAN

In order to monitor groundwater conditions near the alignment of the trench, several types of monitoring data will be collected. Actual locations will depend on the final alignment. Sampling will occur initially on a monthly-basis and after six months on a quarterly basis. Upon completion of the interceptor trench, a detailed monitoring plan will be submitted to USEPA. These may include the following:

- Existing monitoring wells MW-11S (if water is present), MW-17S/D, MW-18S/D;
- Ten (10) new monitoring wells/piezometers will be selected for use as long-term monitoring locations;
- Measurement of liquid levels in trench from clean outs;
- Flow measurements obtained during pumping; and
- Surface water elevation from four staff gauges installed in Fields Brook.

2.6 SOUTHERN AREA REPORTING

Following completion of the Southern Area Supplemental Investigation and subsequent data evaluation, URS will prepare a report of findings. This Supplemental Investigation Report will provide a recommended alignment of the proposed interceptor / interceptor trench, if needed, and provide a Detailed Design of the Remedial Action. In addition, soil and groundwater data will be evaluated and an updated Monitoring Plan for the interceptor trench components will be prepared.

2.7 SCHEDULE

Considering the need for supplemental information to verify transport mechanisms in the Southern Area, the following schedule is proposed:

Task Description	Date
RD/RA Work Plan Submitted to USEPA	October 21, 2005
USEPA Meetings/Approval (2 weeks)	November 4, 2005
Southern Area Supplemental Sampling (4 weeks)	December 2, 2005
Remedial Design of Interceptor Trench (2 weeks)	December 23, 2005
Remedial Design Plans/Specification to USEPA	December 30, 2005

Contractor Mobilization	January 2006, weather permitting

2.8 LONG-TERM MEASURES PLAN

At this time it is not possible to identify the exact location of the Interceptor Trench (if needed). However, Detrex will locate the trench downgradient of dissolved-phased or DNAPL impacted groundwater. It is expected that when the Interim Measures trench is installed that it will also serve as the Long-Term Measures for the Southern Area.

This section of the Site RD/RA Work Plan presents a discussion and description of the short-term measures proposed to investigate and evaluate the potential for DNAPL to migrate to the DS Tributary either in on-site or off-site areas proximal to the Site.

Previous work in this area was described in *Technical Memorandum 3* (Woodward-Clyde, May 1997). This memorandum presented a Feasibility Study that identified several conceptual remedial alternatives for the Site. The USEPA selected Alternative No. IV in the Source Control Record of Decision (ROD), issued September 1, 1997, to address the environmental conditions identified at the Site. With respect to the DS Tributary Area, Alternative No. IV included:

1 A downgradient vertical barrier wall (slurry wall) between the Site and off-site areas to the west;

2 A groundwater collection trench upgradient of the slurry wall; and

3 A groundwater interceptor trench beneath the DS Tributary.

Each of the above outlined items was subsequently addressed in the *Plans and Specifications for Remedial Design/Remedial Action Report*, dated February 17, 2000. A Remedial Action Work Plan for these and other site activities was issued to the agencies on August 28, 2000, and field work was initiated in September 2000. The slurry wall and remedial trench installations were completed and the DS Tributary Remedial System was placed into operation in 2001.

Since the installation and subsequent operation of the above remedial measures in the DS Tributary Area (i.e. northwest corner of the Site), a recently completed investigation commissioned by the FBAG provided field investigation results suggesting the potential recontamination of the DS Tributary from sources located on the site, although no actual data support this conclusion. Even though no DNAPL was observed, the study conclusions stated that the Detrex Source Area was larger then formally presented and represented potential impact to the DS Tributary.

3.1 DS TRIBUTARY AREA DESCRIPTION

The DS Tributary Area, designated as Reach 11-3, is located in the northwest corner of the Site, and flows east to west along the northern Site property boundary where it exits the site through a culvert that passes beneath State Road. From this point, the DS Tributary flows to the west-southwest and eventually south where it enters into Fields Brook. The DS Tributary also approaches the Site from the RMI Facility, in the area located just north of existing monitoring well DETMW04S (see **Figure 3-1**).

Based on historical surface water drainage directions as well as groundwater flow direction, the potential for site-specific constituents and/or DNAPL to discharge to the DS Tributary was considered during the evaluation of remedial alternatives for the Site. The USEPA ultimately approved remedial measures for the entire Site, as well as remedial measures that focused on the DS Tributary Area. These remedial measures were outlined in the previous section, and consisted primarily of a slurry cutoff wall and concurrent groundwater remediation trenches. The general layout of the slurry wall and the passive groundwater collection system is shown in **Figure 3-1**.

The location of the slurry wall was selected to be outside of the previously delineated dissolved phase groundwater impacts as well as the known presence of DNAPL in the subsurface. A low permeability vertical slurry wall was constructed outside of the leading edge of the dissolved phase plume along the western border of the Detrex Site, and was also extended beneath the active railroad spur and onto the RMI Sodium Property to the north. The slurry wall was installed from ground surface through and into the interface between the lacustrine clay deposits and the underlying glacial till. In Spring 2005 a groundwater monitoring well was installed down gradient of the slurry wall to monitor groundwater elevations and quality. Results from sampling have not detected any VOCs at this time.

A groundwater collection trench was installed immediately upgradient of the slurry wall to a depth below groundwater, and the surface water elevation in the DS Tributary, in order to collect groundwater that could potentially mound behind the slurry wall. A groundwater interceptor trench was also installed beneath the east-west running portion of the DS Tributary, along the northern property boundary, to prevent the migration of groundwater into the DS Tributary. All groundwater collected in the two (2) trenches is routed via a gravity drain to a storm water pump station, for treatment through the Site's storm water treatment system prior discharge. Additionally, a berm across the former drainage ditch that discharged to the DS Tributary was constructed to eliminate the direct discharge of surface water from the Site. It should also be noted that no DNAPL has been detected in the groundwater remediation trenches associated with the DS Tributary remediation system since operations began.

Results presented by FBAG in their September 30, 2005 report indicated several areas of elevated headspace readings and visible DNAPL along the DS Tributary (Area EU-6), though no free DNAPL was observed in any Geoprobe sample around the DS Tributary, particularly to the west of State Road in the area of the culvert that runs beneath the road. As a result, noted areas proximal to the DS Tributary will be a focus of the proposed supplemental investigation and data evaluation, as outlined in the following sections of this Work Plan.

3.2 DS TRIBUTARY AREA DATA GAP ASSESSMENT

In order to fully address the recent data related to DNAPL presence in the DS Tributary, as referenced in the September 2005 USEPA correspondence to Detrex, Detrex plans to complete an evaluation of the DS Tributary Area and the associated existing remediation system. This supplemental investigation was formulated based on the preliminary development of a data gap assessment. This proposed assessment is viewed as dynamic as it will be refined throughout the course of the evaluation, and will include, but not be limited to, a review of remedial operation, maintenance, and monitoring (O&MM) results of the groundwater remediation trenches and DNAPL recovery system.

At this time, the data gap assessment is estimated to include the completion of the following items:

- Review O&MM data generated for the groundwater remediation trenches
  - Integral sump operational set points

  - Designed operational groundwater elevation(s)
- Review O&MM data generated for the DNAPL recovery system
- Implement and evaluate additional O&MM data gathering efforts
  - Visual inspection of installed cleanouts and pump stations within the groundwater remediation trenches
  - Evaluation of groundwater levels within respective remediation trench access points (sumps, cleanouts), if possible
  - Visual inspection of the DS Tributary inlets and outfalls in the area
- Evaluate surface water levels (elevations) within the DS Tributary
  - Develop conceptual model of surface water – groundwater flow dynamics in the area of the groundwater remediation trenches
  - Visual inspection of installed cleanouts and pump stations within the groundwater remediation trenches
  - Installation of staff gauges at strategic locations within the DS Tributary
- Evaluate the FBAG and USEPA referenced DNAPL areas within the northwest corner of the Site in the area of the DS Tributary
  - Install direct push borings to evaluate the subsurface for the presence of DNAPL
  - Install temporary piezometers, as necessary, to aid in the evaluation of the groundwater flow regime

The execution of the data gap assessment will serve to verify or supplement the current understanding of the conceptual site model and is integral to the development of potential remedial system enhancements, either spatial or operational, to the existing DS Tributary Area remedial system

3.3 DS TRIBUTARY AREA INVESTIGATION AND DATA EVALUATION

As described in the previous section and based on the reported DNAPL presence in the DS Tributary, Detrex will implement a focused supplemental investigation. The objectives of this investigation are:

- To verify the potential presence and source of DNAPL reported in the DS Tributary
- To evaluate the surface water – groundwater hydraulic regime in the DS Tributary Area
- To identify or dispel possible migration pathways and migration potential for DNAPL at the Site
- To verify the subsurface conditions with respect to the existing conceptual site model
  - Geologic
  - Hydrogeologic

  - DNAPL

- To refine the O&MM of the current DS Tributary Area remedial system and determine if potential remedial upgrades or additions are required

The supplemental investigation that has been developed for the DS Tributary Area includes the installation of staff gauges within the DS Tributary, completion of direct push technology (DPT) soil borings, and installation of temporary piezometers utilizing DPT. **Figure 3-2** presents the locations of the proposed staff gauges, DPT borings, and temporary piezometers.

The staff gauges will be installed within the DS Tributary in a manner that does not cause flow restrictions and anchored appropriately to facilitate future measurement of water elevations within the tributary, in order to permit ongoing data evaluations. Following installation, the respective staff gauges will be surveyed utilizing the existing datum for the Site. A total of five (5) staff gauges are proposed for installation at the locations depicted in **Figure 3-2.**

A total of fourteen (14) DPT borings are proposed for the DS Tributary Area, in order to confirm the current understanding of the subsurface conditions (**Figure 3-2**). The final locations for these respective monitoring points will be ultimately based on field observations; therefore, the locations depicted on Figure 3-2 are approximate. Soil and groundwater sampling will be completed within each DPT boring. The DPT borings will be advanced utilizing a continuous sampling system in order to comprehensively evaluate the subsurface stratigraphy. The field screening of soil samples will be completed following a standardized field headspace analysis procedure. Details are provided in Section 4.0.

The results of the headspace screening and observations made on the stratigraphic materials, occurrence of groundwater, and presence of DNAPL within respective test borings will serve as the guidance for the selection of soil samples to be submitted for VOC and SVOC laboratory analysis (see Section 4.0). It is estimated that one (1) soil sample from each DPT boring will be submitted for analytical testing. All completed DPT borings not utilized for temporary piezometer installations will be backfilled with bentonite.

Groundwater sampling will be completed for each DPT boring location, utilizing standard DPT hydropunch or equivalent, in order to verify the current conceptual site model and provide for detailed data on the nature and occurrence of dissolved phase constituents in the DS Tributary Area. The specific depth interval will be based on the observations determined during completion of the respective DPT borings. Should the hydropunch not be able to be deployed in the completed DPT boring, the hydropunch will be advanced to the selected depth interval immediately adjacent to the completed DPT boring. Groundwater sampling will be completed by either low-flow pumping utilizing dedicated, disposable tubing or a decontaminated bailer, depending on the selected sampling depth. At this time, it is estimated that one (1) groundwater sampling interval will be selected for each DPT boring. Groundwater samples will be submitted for VOC and SVOC laboratory analysis (see Section 4.0).

Temporary monitoring wells are proposed for seven (7) of the fourteen (14) DPT locations, as noted on **Figure 3-2.** The intent of these temporary monitoring wells is to permit groundwater elevation measurements over time and periodically monitor COCs in groundwater. These data

will be utilized in conjunction with the staff gauge levels in order to effectively evaluate the surface water – groundwater interaction, as well as the groundwater flow regime dynamics in the immediate vicinity of the DS Tributary Area remediation system. At this time, URS anticipates that the temporary monitoring wells will be constructed utilizing standard DPT pre-packed well materials. Following installation, the temporary piezometers will be developed until relatively clear, sediment-free groundwater is produced, to the extent practical. Each of the DPT boring locations will be surveyed to the current site datum.

In addition to these intrusive activities, URS will complete a DNAPL Mobility Evaluation in order to verify the conceptual site model and current understanding of the DNAPL present in the subsurface and reported in the DS Tributary, referenced in recent USEPA correspondence. This evaluation includes a determination of the potential for DNAPL to migrate, laterally and vertically, under stable and dynamic conditions at the Site. In order to complete this evaluation, site-specific data will be required. These data will be either furnished through review of the existing site database or supplemented with data from the proposed supplemental investigation. The site-specific data required for this evaluation includes:

- Potentiometric data;
- DNAPL gauging data;
- Thorough review of site boring logs and descriptions of geologic materials;
- DNAPL physical property data (density, viscosity, interfacial tension);
- Grain size distribution testing for each identified geologic material; and
- Hydrogeologic testing data.

If warranted, based on the findings of the supplemental investigation, the DNAPL Mobility Evaluation will be completed, provided sufficient data is available. If completed, this evaluation will be utilized to supplement the current conceptual site model and potentially serve to:

- Determine the current potential for DNAPL migration at the Site in static and dynamic areas of the Site;
- Determine or validate design criteria for potential and/or existing DNAPL recovery locations; and
- Determine operational recommendations for existing or potential future DNAPL recovery locations to prohibit potential adverse DNAPL mobilization / migration.

The overall supplemental investigation is anticipated to require approximately one (1) month of field work initially, with the periodic collection of subsequent data from established monitoring points, staff gauges and temporary monitoring wells, continuing in the following months. The data generated initially and over time will be incorporated into the existing conceptual site model

and utilized to develop short- and long-term remedial modifications or additional remedial actions for the DS Tributary Area.

3.4 DS TRIBUTARY AREA REPORTING

Following the completion of the DS Tributary Area Supplemental Investigation and subsequent data evaluation, URS will prepare a report of findings. This Supplemental Investigation Report will provide recommendations on interim or short-term remedial measures necessary to address the noted DNAPL presence in the DS Tributary, if warranted.

URS will continue data evaluations and conceptual site model revisions utilizing the expanded monitoring network in order to develop a long-term strategy for the DS Tributary Area, as necessary. This will be documented in a separate submittal that will include a discussion of the completed data evaluation activities, as well as recommendations for remedial modifications or additional remedial measures, if necessary, to the current DS Tributary Area remediation system.

3.5 SCHEDULE

Considering the need for supplemental information to address potential data gap assessment issues in the DS Tributary Area, the following schedule is proposed.

Task Description	Date
RD/RA Work Plan Submitted to USEPA	October 21, 2005
USEPA Meetings/Approval (2 weeks)	November 4, 2005
DS Tributary Supplemental Sampling (4 weeks)	December 2, 2005
DS Tributary Investigation Report (2 weeks)	December 23, 2005
On-going Continued Monitoring (6 months)	March 3, 2006
Remedial Design of DS Tributary Modification	March 10, 2006

3.6 SHORT-TERM / LONG-TERM MEASURES PLAN

As described, additional site-specific data will be collected for the DS Tributary Area, in order to verify or rule out DNAPL movement. Upon review of the data collected and the results from monitoring, a Proposed Remedial Design for Short-Term / Long-Term modifications to existing components will be developed.

4.1 EXPLORATORY BORINGS AND SOIL SAMPLING

Prior to commencement of field operations, the Ohio Utilities Protection Service (OUPS) will be contacted regarding the presence and location of underground utilities. Additionally, all boring locations will be reviewed and cleared by Detrex personnel familiar with Site operations.

Detrex proposes to advance approximately twenty-four (24) Geoprobe soil borings within the Southern Area proximal to and along the proposed interceptor trench alignment. Additionally, Detrex proposes to advance approximately fourteen (14) Geoprobe soil borings in the DS Tributary Area. All direct push boring activities will be performed by a pre-qualified operator. A qualified geologist will visually monitor the drilling operations and collect, classify and log soil samples using the United Soil Classification System (USCS) in accordance with American Society of Testing and Materials Method D2488-00 (ASTM, 2000). Proposed soil boring locations are presented in **Figures 2-3 and 3-2**.

Soil borings will be advanced using a hydraulically-driven, direct-push rig (truck-mounted Geoprobe® Model 5400) per ASTM Method D6282-98 (ASTM, 1998). Samples will be continuously collected in 4-foot intervals using a large-bore, dual-tube, stainless-steel sampler. The sampler will be lined with dedicated, vinyl acetate liners. The sampler will be pushed to the desired depth, and then retrieved. Upon retrieval from the sampler, the soil samples will be divided into 2-foot intervals for description and screening. The borings will be advanced to the top of the till clay unit to approximate depths ranging from 20 to 30 feet below ground surface (bgs).

Before advancing each soil boring, all drilling and sampling equipment in contact with soils will be cleaned with a pressurized, hot water sprayer. During drilling operations, sampling equipment will be cleaned using a non-phosphate detergent wash and a potable water rinse. Drilling and sampling equipment will be allowed to air dry following decontamination.

Borehole cuttings will be placed into 55-gallon drum and stored at a location designated by Detrex personnel. All work will be supervised by a URS representative.

4.2 FIELD SCREENING PROCEDURES

A 10.6 eV photo ionization detector (PID), manufactured by Rae Systems will be used to screen for the presence of VOCs in the headspace of soil samples. Up to two (2) samples will be submitted for laboratory analysis from each boring. Sample selection will be based on headspace screening results and proximity to the top of the clay and till layers. Samples with the highest head space reading, as well as, the sample immediately above the top of the clay and/or till layer will be submitted to the laboratory for analyses. The MiniRae will be calibrated as described in the Rae Systems *Instructions and Service Manual* using 100 parts per million (ppm) isobutylene. Calibration results will be recorded in the field logbook.

Headspace screening of soil samples will be conducted in the field in the following manner:

- After sample collection, each sample will be split in half. One-half is placed in a laboratory-supplied, 4 ounce glass container and with a Teflon-lined lid and placed in an iced cooler for potential submittal for laboratory analysis. The jar will be filled so that no head space is visible in the container.

- The other half is placed in a re-sealable plastic bag, sealed and vigorously shaken.

- Following a period of approximately 10 minutes for accumulation of organic vapors, the re-sealable plastic bag is again shaken. The MiniRae probe is inserted through a small opening in the plastic bag. The highest organic vapor concentration in the headspace of each sample container is then measured and recorded in the field log book.

- After screening, the portion of the sample subjected to headspace screening is placed with the borehole cuttings for disposal.

4.3 SAMPLE IDENTIFICATION

All analytical samples will be assigned a unique sample identifier. The identifier will be comprised of the following information:

- Sample Location (geoprobe identification number, (i.e., DETGP-101),

- Sample Interval, Depth (02-04),

- Sample date , and

- Sample type (Environmental, Replicate, or Trip Blank).

4.4 LABORATORY ANALYSIS OF SOIL SAMPLES

Soil samples shall be analyzed for pursuant to the following Methods:

1 Volatile Organic Compounds (VOCs) by USEPA Test Method 8260

2 Semi-Volatile Organic Compounds (SVOCs) by USEPA Test Method 8270

Samples will be shipped to Firstech Laboratories of Cleveland, Ohio in an insulated cooler with ice under standard chain-of-custody protocol.

4.5 GROUNDWATER MONITORING WELL INSTALLATION AND DEVELOPMENT

Approximately twenty-six (26) temporary monitoring wells will be installed in the designated soil borings (19 Southern Area, 7 DS Tributary Area). Monitoring well installation activities will be performed in accordance with ASTM Method D6724-01 (ASTM, 2001). The monitoring wells will be constructed of 1-inch diameter, flush-threaded poly-vinyl chloride (PVC) pipe to depths ranging from 20 to 30 feet bgs. This depth is an estimate and the final depth will be

considered based on field observations. Ten feet of 0.010-inch slotted, pre-packed, PVC well screen will be installed in all of the wells. A 2-foot thick, bentonite seal will be placed above the screened interval of each well and hydrated with potable water. The remainder of the annular space will be backfilled with a bentonite/cement slurry. A protective, locking cap will be installed on each well. A 6-inch diameter steel upright well cover will be placed over each well and set into a 2-foot square concrete pad. Proposed monitoring well locations are presented on **Figures 2-3 and 3-2.**

Monitoring wells will be developed by the removal of up to 10 well-casing volumes of water with small-diameter, dedicated, high-density polyethylene (HDPE) bailers. Each well volume removed will be field-tested for temperature, pH, and conductivity using a field water quality meter. Well development will be determined to be complete when the three consecutive readings of water quality parameters have stabilized to within 10%. Well development data will be recorded in the field log book.

Monitoring well development water will be temporarily stored in 55-gallon drums until it can be processed through the Detrex water treatment system and discharged under existing NPDES permits.

4.6 SITE SURVEYING

An elevation survey will be conducted using a surveyor's level. The top-of-casing elevations of monitoring wells and the ground surface elevations will be surveyed and referenced to the site benchmark that is consistent with previously completed site investigations.

4.7 GROUNDWATER MONITORING

All groundwater samples will be collected using disposable, high-density polyethylene bailers. This technique involves sampling groundwater by purging the well by lowering the bailer into the water column and removing groundwater from the well until the water quality parameters have stabilized.

The following information will be recorded in the field log book at each groundwater sampling location:

- Date and time,
- Barometric conditions, temperature, and general weather conditions,
- Depth to water measured from the surveyed top of the well casing,
- Depth to the top of DNAPL (if any), and
- Depth to bottom of well measured from the surveyed top of the well casing.

A standard electronic water level indicator will be used to take the measurements for locations located outside of the DNAPL impacted area. Additionally, the wells will be measured in order from least impacted to most impacted. This determination shall be made based on the most current groundwater analytical results. The water level indicator will be decontaminated between each well as specified in Section 4.8.

DNAPL measurements will be collected utilizing a dedicated interface probe, which is capable of measuring the top of the water column, as well as, the top of the DNAPL layer (if present). Due to the difficulty in adequately decontaminating the interface probe, it will only be used in monitoring wells that routinely contain DNAPL. Monitoring wells located outside the DNAPL plume area will be assessed for the presence of DNAPL by lowering a bailer to the bottom of the well during each quarterly sampling event. Visual observations will be recorded in the field log book.

On the basis of the above measurements and well diameter, the volume of water standing in each well will be calculated. Well purging will be conducted by lowering the dedicated one-time use HDPE bailer into the well. Prior to initiating the well purging and after each well volume, the discharge water will be measured for specific conductance, pH and temperature. All purge water will be containerized and disposed of through the Detrex water treatment system in accordance with federal, state and local regulations.

Sampling will commence after at least three well volumes have been purged or parameters (temperature, pH, and specific conductance) have stabilized (defined as 10 percent or less parameter fluctuation between two successive measurements). If the well is purged dry or is purged such that the full recovery period exceeds 2 hours, the well will be sampled as soon as a sufficient volume of groundwater has accumulated in the well to allow the collection of the necessary groundwater samples.

Sampling will be performed using the same equipment as that used for purging. All field measurements will be documented in the field logbook.

- At each location, groundwater samples will be collected for VOCs and SVOCs, as required,
- After the groundwater parameters have stabilized or after a minimum of three well volumes have been purged from the well, samples will be directly poured into laboratory supplied glassware.
- Samples will be immediately placed in an iced cooler and maintained at a temperature of 4 degrees Celsius or lower, without freezing until they are delivered to Firstech Laboratories of Cleveland, Ohio under standard chain-of-custody protocol.

With the exception of the detergent that will be used for the initial cleaning, the solutions used to decontaminate the field equipment will not be re-used. All spent solutions will be containerized and disposed of through the Detrex water treatment system in accordance with federal, state and local regulations. Disposable equipment will be contained in a plastic garbage bag for disposal as solid waste.

4.8 DECONTAMINATION PROCEDURES

All sampling equipment to be utilized will be one time use and will be disposed of following use at each well. The water level indicator and the interface probe require decontamination prior to use at each location. The entire length of cable that comes into contact with groundwater or DNAPL will be decontaminated in the following manner:

1 The equipment will be rinsed with clean potable water,

2 Followed by an Alconox/water solution rinse;

3 Followed by a deionized water rinse.

If DNAPL is encountered the equipment will be rinsed with Methanol following the Alconox/ water solution rinse.

4.9 SAMPLE IDENTIFICATION

All analytical samples will be assigned a unique sample identifier. The identifier will be comprised of the following information:

- Sample Location (monitoring well identification number, (i.e., DETMW-04S),
- Sample date , and
- Sample type (Environmental, Replicate, or Trip Blank).

4.10 SAMPLE HANDLING AND PACKING

Samples will be collected in order and containerized according to the volatility of the target analytes. The collection order for the analytes is as follows (where applicable):

- Volatile organics (VOAs or VOCs)
- Semivolatile organics (SVOCs)

Immediately following collection, samples will be placed in iced, insulated coolers. Samples will be packed in bubble wrap or equivalent material, placed in iced, insulated coolers and shipped to the approved laboratory via overnight courier. Proper chain of custody will be maintained during sample handling and shipping activities.

4.11 QUALITY ASSURANCE/QUALITY CONTROL

QC samples will be collected at the following frequencies:

1 Field Duplicates (D) – One (1) per 10 environmental samples collected or a minimum of one per sampling event,

2 Field Blank Samples (B) – One (1) per 20 environmental samples collected,

3 Trip Blank Samples (TB) – One (1) trip blank will be included in each cooler containing samples for VOC analysis,

4 Organic Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – One (1) per 20 environmental samples collected, and

5 Inorganic Matrix Spike/Laboratory Duplicate (MS/LD) Samples – One (1) per 20 environmental samples collected.

4.12 EQUIPMENT CALIBRATION

Instruments used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field measurement instruments will include one or more of the following: multi-parameter meter, pH meter, specific conductance meter, thermometer (or temperature probe), and electronic water-level indicator. As a rule, each field measurement instrument will be calibrated daily prior to use and the calibration checked every 15 samples.

Calibration procedures will be documented in the field records. Documentation will include the date and time of calibration, the identity of the person performing the calibration, the reference standard used, the readings taken, and any corrective action.

4.13 SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS

The following table presents the sample container, preservation and holding time requirements:

Analysis Method	Sample Container	Preservative	Holding Time
SW846-8260B (VOCs) aqueous	Three 40-ml glass vials with Teflon-lined caps	No headspace HCL to pH<2 Ice (4°C)	14 days from time of collection
SW846-8270C (SVOCs) aqueous	Two 1-liter amber glass bottles with Teflon-lined caps	Ice (4°C)	7 days from time of collection